

What is an accident?

by Tom Crawford, Chief of Occupational Health, Environment, Fire and Safety (OHEFS)

Take this quick safety quiz. Check a box if you think it describes an accident.

- ☐ A child trips over a lamp cord, causing the lamp to fall harmlessly onto the sofa. The child does not fall.
- ☐ A child trips over a lamp cord, causing the lamp to fall harmlessly onto the sofa. The child, however, falls onto her hands and knees before taking one on the chin.
- ☐ A child trips over a lamp cord, causing the lamp to fall to the ground and shatter. The child does not fall.
- ☐ A child trips over a lamp cord, causing the lamp to fall to the ground and shatter. The child falls onto her hands and knees before taking one on the chin.



Which boxes did you check? I hope all of them, because they all describe an accident. “How can that be?” you ask. After all, in the first scenario, the lamp didn’t break and the child didn’t get hurt. Herein lies the problem – the commonly held notion that an accident must involve injury, illness, or loss. In each case, a hazard (the cord over which she tripped) was present, the cause of the accident never changes, and the solution is always the same. The only difference between the examples is their outcome. So throw away your old idea of what an accident is and lock this simple definition away – an accident is nothing more than “an unexpected or unintentional event.”

Let me ask you this: is an accident a “bad” thing? Although we generally think of an accident in negative terms, some accidents aren’t bad ... in fact, they’re quite good. We call these accidents “serendipities”. Case in point, the serendipitous discoveries of the telephone, vulcanized rubber, nylon, and “Post Its” adhesive. None of these inventions would have ever been a significant part of our lives were it not for some fortunate accidents. The outcomes of our accidents therefore span the entire spectrum. They could have unfortunate consequences (e.g., a vehicle crash on a slippery road), they could change the world (e.g., the discovery of penicillin), or they could be relatively harmless (e.g., a lamp falls safely onto a well-padded sofa) ... but they’re all unexpected, they’re all unintentional, and, therefore, they’re all accidents.



Louis Pasteur once said, "In the field of observations, chance favors only the prepared mind." Pasteur would have done well in the field of risk management where a simple matter of timing and chance is sometimes all that separates a simple accident from one with catastrophic consequences.

Be sure to stop back next week to learn how timing and chance can alter an accident’s outcome.



Do you feel lucky?

by Tom Crawford, Chief of Occupational Health, Environment, Fire and Safety (OHEFS)

Last week, we learned that **accidents are nothing more than unexpected or unintentional events**. If a tree limb falls during a bad storm but narrowly misses the hood of your brand new B-mer, it's still an accident, right? (If you disagree, go back and review last week's [News and Views](#) article.) When you discover what almost happened, you breathe a sigh of relief and count your blessings ... and never park under a tree again!



What you just experienced is what safety professionals call a “near miss” or “free warning”. You got lucky. And since you understand this, you take action now, for you might not be so fortunate next time.

Now consider this scenario: while walking through downtown Bad Aibling, a brick falls to the sidewalk and disintegrates just a few feet in front of you. Startled, you look up and see some masons working on a scaffold high above you. An accident happened, right? A near miss? Thankfully. I shudder to think what would've happened had you been in that brick's path. What prevents this accident from having grave consequences? Good timing on your part. But is that anyway to be safe? Can you depend on good luck or fortunate timing to protect you? Of course not. Those masons need to prevent that accident from ever happening again, but they might not take action (or know to take action) unless the accident is reported.



Now let's say you narrowly avoid falling down the stairs after slipping in a puddle of coffee that someone else spilled just minutes earlier. An accident occurred, right? (Actually, it's two accidents: first, someone spilled their coffee, and then you slipped.) You weren't injured, but it was a near miss. What would you do now? (a) Clean up the spill; (b) report the spill to someone else; or (c) mop your forehead, mutter some nasty words, and keep on moving? Unfortunately, most people keep on moving. They make a mental note to be careful while walking down the stairs next time, but that's where it often ends. Sadly, others aren't given the opportunity to benefit from the “free warning”, and the spilled coffee later claims a less fortunate victim.



The point I'm trying to make here is to **heed your free warnings**. For everyone else's sake, don't ignore your near misses – report them. Tell your parents, tell your supervisor, tell your teacher, call in a work order, or call me. We need one another's help to avoid accidents. Please do your part.

Join me next time as we begin to explore the risk management process. It's interesting ... REALLY!

Managing Risk – You do it every day!

by Tom Crawford, Chief of Occupational Health, Environment, Fire and Safety (OHEFS)

When your children were young, you taught them to look both ways before crossing the street. Once they grasped the importance of this valuable safety lesson, they probably wouldn't budge from the curb if they saw a car even far off in the distance.

They were practicing "risk avoidance". When they grew a bit older, they began to judge the speed of the cars better and could gauge whether or not they had enough time to cross the street. Risk avoidance had now been replaced by "risk management", a concept that requires us not only to recognize a hazard but to assess the level of risk it poses.



Have you ever driven on roads which you had been warned were terribly unsafe? Do you ever skip fastening your seat belt because you're only traveling a short distance? Do you ever operate your weed wacker without safety glasses or your leaf blower without hearing protection? If so, you're practicing risk management, albeit very poorly.

The risk management model follows the five-step, continuous process spelled out here:



The first step requires that we be able to **identify hazards**. Parents know that young children aren't always able to understand the consequences of touching a hot stove, flying kites near power lines, or leaning against window screens. But even adults may sometimes have trouble recognizing some hazards. For example, when Madam Curie discovered polonium and radium, she had no idea how her exposure to those radioisotopes was slowly ravaging her body, and she ultimately died from the cumulative effects of radiation exposure. When Pat Hayes was sent into a huge grain silo to "walk down the corn", his employer never imagined that he would next see Pat in a morgue with two tear streaks running down his tortured face, the result of being engulfed and crushed to death. And when New York's infamous Triangle Shirtwaist Factory caught fire in 1911, no one ever imagined that 145 garment workers (mostly young women) would die at the hands of the building code professionals who permitted the occupancy of a building with too few exits.

Hazard identification is an important step, but the other steps in the process are no less important. Join me next time for a look at the next step, hazard assessment. In the meantime, visit http://www.welltown.gov.uk/teachers/teachers_kitchen.html with your children for a fun and interactive look at hazards around your home. And see if you can spot the hazards in the pictures below.



This man helped build the Empire State Building ... and survived in spite of himself. At the time, he was working almost 1000 feet above Fifth Avenue.



Yes, someone actually works here. (And, no, this isn't the worst I've ever seen.) Granted, it CAN'T be very productive to work in this mess, but what hazards do you see? Be creative.



There are actually two hazards in this picture. One is obvious, but can you spot the second?



This powerstrip exhibited four hazards when I found it. Two can't be seen, but can you spot the other two?

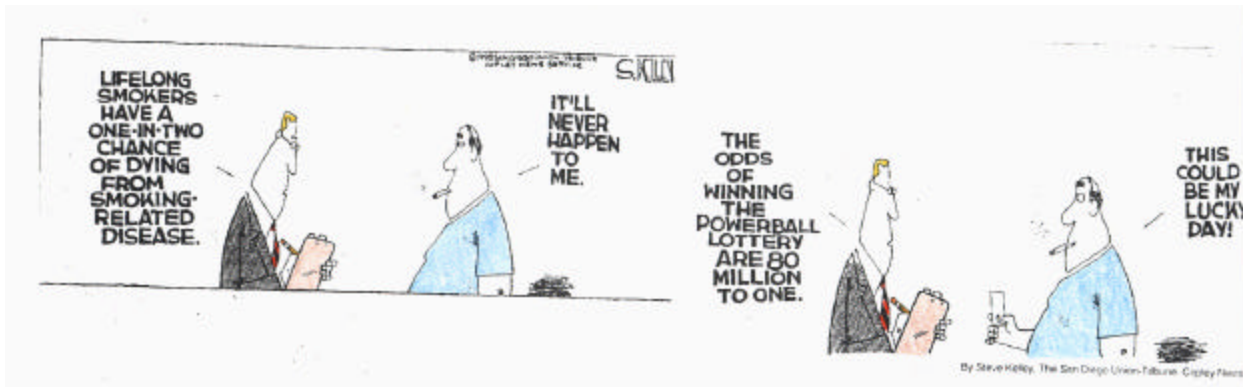
Step 2 - Risk Assessment

by Tom Crawford, Chief of Occupational Health, Environment, Fire and Safety (OHEFS)

Last time, I introduced you to the risk management model, and you learned that hazard identification was an important first step in the process. (Could you find all the hazards in the pictures?) Now let's talk about risk assessment. It's a complex process and one of my favorite topics – in fact, I developed a training module on this subject for the National Cryptologic School.

Before we go any further, we should take a moment to define what risk is. First, risk requires exposure to a hazard; second, it requires that we consider the possibility of loss or injury from that exposure. If someone stands on the top rung of a wobbly old ladder, there's a good chance they will fall and hurt themselves. Both a hazard and the possibility of injury exists. We therefore have risk, but how much?

Well, sometimes that depends upon whom you ask. Are you the type of person who drives on the snow and ice when you're advised not to? Why or why not? That's a tough question to answer, but suffice it to say that your previous experiences driving in those conditions play a big part in your decision. So do things like your mood, how your role models (e.g., your parents) behave in those circumstances, and the rewards you expect to gain (or the treasures you're likely to lose) by taking that risk.



This man suffers from "The Other Guy Delusion". What he fails to understand is that, to everyone else, HE is the other guy!

Here's a scenario I call "The Poison Pill". Let's imagine that an unmarked bottle is filled with 100 identical-looking pills. Ninety-nine of the pills will add five years to your life, but one will kill you within a week. Would you take one? If you're young and in good health, it may not make much sense to take the chance. But if your best years are behind you or your health is failing, those extra five years may be worth the gamble. Now imagine that I change the potency of the pills: instead of adding five years, they'll add twenty-five years. Any more takers? Or what if I reduce their effectiveness to one year – how does that affect your decision? Your decision is clearly driven by



what you hope to gain, what you hope to avoid, and your perceived odds. I have many other examples (including my favorite, “Baby on a Balance Beam”) to illustrate how risk is influenced by external and internal factors, but let’s simply accept here that the degree of risk may depend upon whom you ask.

Having said that, our risk management model depends on our ability to derive a quantitative assessment from a qualitative hunch (or educated guess). No decision-maker ever wants to make a mistake, especially when a person’s welfare is on the line. And yet none of us have enough money or time to live a life or manage a business based upon a “risk avoidance” model. So someone much smarter than me came up with a simple but effective tool for us to help rank risks – we call them Risk Assessment Codes, or RAC for short. Here’s how it works. After identifying the hazard, you determine, to the best of your ability, the severity and probability of injury (or loss) that the hazard is likely to bear. Then, using the RAC table below, you determine the relative risk presented by that hazard. Armed with the RACs, you can prioritize which hazards must be controlled first.

Mishap Probability

- A - likely to occur immediately
- B - probably will occur in time
- C - possible to occur in time
- D - unlikely to occur

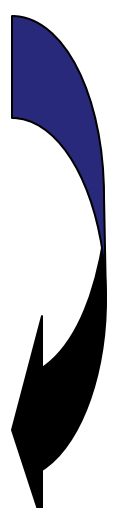
Hazard Severity

- I - death or permanent total disability
- II - permanent partial disability or temporary total disability in excess of 3 months
- III - lost-workday mishap or compensable mishap
- IV - first aid or minor supportive medical treatment

	A	B	C	D
I	1	1	2	4
II	1	2	3	4
III				
IV				

RAC

- 1 = Imminent Danger
- 2 = Serious
- 3 = Moderate
- 4 = Minor
- 5 = Negligible



Note: The Army uses a different matrix, but the principle is the same. Note the similarities.

Severity vs. Probability

Initial & Residual Risk

			HAZARD PROBABILITY					
			Frequent	Likely	Occasional	Seldom	Unlikely	
			A	B	C	D	E	
E F F E C T	Catastrophic	I	Extremely High					
	Critical	II	High	High				
	Moderate	III		Medium		Low		
	Negligible	IV						

Confused? By now, you know I like examples, so here's one to clear things up. Let's say you observe a housepainter up on the roof of your neighbor's two-story Colonial house. He's lying belly-down, leaning over the drip edge, painting the wooden fascia. It's a clear day, and the wind isn't blowing. Based on my experience, I know that a fall from this height is likely to be tragic, and few would argue with me ... so let's score the "hazard severity" as a Roman numeral "I". Now, how likely is he to fall? Here is where you may disagree with me, but, under the circumstances, I'm going to score the "mishap probability" as a "C" (i.e., possible to occur in time). Looking at our matrix, we see that this hazard is a RAC 2, or a "serious" hazard. On our scale of 1 to 5 (with "1" being the worst), that's pretty bad. If you were his boss and could only afford to eliminate one hazard this month, would you fix this RAC 2 hazard or would you focus your resources on a RAC 4 hazard on another job site?

Simple to apply, yes. A valuable tool for decision-makers, absolutely. A vital part of the risk management model, you bet. But for safety professionals, the RAC is only part of the equation. What do you do when you have only a handful of people exposed to a RAC 2 hazard but thousands of people exposed to a RAC 3? Where do you focus your attention? Where do you spend your money? How do you resolve the liability? Hmmmm ... want to learn more? Give me a call. Otherwise, keep a lookout for my next article in this series.

Steps 3 and 4 – Developing and Implementing Controls

by Tom Crawford, Chief of Occupational Health, Environment, Fire and Safety (OHEFS)

Let's review. Two weeks ago, we learned that hazard recognition was an important first step in the risk management process. Last week, we learned that "RAC" is an acronym that stands for Risk Assessment Code, a tool that helps us determine a hazard's relative risk. But once we identify a hazard and assess its risk, we still need to figure out how to prevent that hazard from hurting people or damaging property. We need to develop hazard controls.

Pretend for a moment that you are a steel mill worker from Pittsburgh, PA, circa 1950. Your work is dirty, noisy, hot, and strenuous. It will be twenty years before OSHA is "born" (and just as long before the Steelers begin to build their dynasty), but there's a young industrial hygienist on the staff who realizes that your constant exposure to those working conditions may make you ill (or worse) if management doesn't soon do something. For no particular reason, he decides to focus first on the noise hazard, and he subsequently presents the following control options to management:



- Implement hearing protection (e.g., ear muffs)
- Control daily exposure by rotating workers into and out of jobs in quieter work environments
- Redesign the process so that the employees can do the work remotely from a quiet control room
- Purchase less expensive steel from Japan (okay, that's not funny and it wasn't even an option in 1950)

Which solution do you imagine management chose to pursue? Ear muffs, of course! Why? Because they're inexpensive and it's a quick solution. Unfortunately, that should have been their final option, not their first. I suppose you can't blame them, everyone thought that way. Life in America was different then. We certainly didn't understand some occupational hazards then the way we do now.

Nowadays, we try to "engineer out the hazard" first. In other words, we try to design processes so that workers aren't exposed to hazards in the first place. We install guards (think of a powersaw) and interlocks (think of how your microwave oven stops when you open the door). We integrate seismic measures into the buildings on the West Coast, and we automate work to let machines do work for us. But when engineering controls fail, we pursue administrative controls like job rotation and training. And as a last resort, we provide personal protective equipment, or PPE. Things like ear plugs, safety glasses, hard hats, chemical resistant clothing, and respirators should be our last line of defense, not our first. Why? Because when PPE fails in the absence of other controls, there's nothing to separate the employee from the hazard.

Granted, there are times when engineering solutions may be cost-prohibitive, but would you rather pay \$5,000 now for a material handling device or \$25,000 down the road to pay for a back injury that could have been prevented by the purchase of that \$5,000 tool?

Does the process stop here? Absolutely not. Join me next time to discuss the important but often forgotten “evaluation” step.

Step 5 – Evaluating Hazard Controls

by Tom Crawford, Chief of Occupational Health, Environment, Fire and Safety (OHEFS)

Okay. We've reached the last step in our risk management process ... sort of. Remember that this is a continuous process and therefore has no beginning or end to speak of. The evaluation step is when we get to sit back for a moment and witness the glory of our creation, marvel at the magnificence of our controls, bask in the splendor of our superior creativity ... or go back to drawing board.



If you tell a child over and over again not to stick things in electrical outlets but they keep on doing it, then your control (an administrative one) is clearly not effective. The hazard still exists, the risk is still high, and your quota on “free warnings” is quickly running out. Time to develop a new control. When I was a kid, they didn’t have childproof outlet inserts; nowadays, they’re a must for parents with young children. This engineering solution is inexpensive but highly effective.

But Heaven forbid, what if our controls aren’t effective ... then what?

Allow me to illustrate. Annual urine and blood tests of some chemical lab employees revealed an unacceptably high level of a toxic compound. When the lab manager learned that the toxin could be absorbed through the skin, he hastily ordered that everyone wear gloves. Everyone did. When the routine, annual tests were performed again, the employees were found to have an even greater concentration of the toxin in their system! Figuring that people were wearing the wrong gloves, the lab manager finally did the research to identify some that were better suited for handling the toxin. After the next screening, the lab manager was shocked to discover that the problem wasn’t getting any better. Realizing that another route of exposure existed, he ordered that respirators be worn. Unfortunately, the company’s respiratory protection program lacked some key program elements, and the toxin was still detected in their bloodstream (albeit in lower concentrations). Finally, lab hoods were installed (with an alarm to indicate when the ventilation system wasn’t working) and workers now handled the chemical with gloves under the control of the lab hood. No surprise, the concentration of the toxin in their bloodstreams began to dip drastically soon after.

Okay, what went right in the scenario above? First, the employees were participating in an annual physical designed to look specifically for occupational exposures. Second, the lab manager kept evaluating and looking for solutions, although waiting an entire year to determine those solutions’ effectiveness is unconscionable. And third, they finally found the best way to control the exposure.

Now for what went wrong. Did you notice that the lab manager’s first solution was the use of PPE (i.e., gloves)? Remember that PPE should always be our LAST resort. Further, he assumed that the toxin was being absorbed exclusively through the skin. And while they eventually arrived at a good engineering solution, they should’ve pursued this one FIRST. One final thing: this happened at a small company. Our occupational health nurses and physicians would never allow that exposure to go unchecked.

It's a continuous cycle, folks. Risk Management is not complicated, and it's well worth the time to avoid needless headaches (or worse) down the road. Base closure will come along sooner than you think. Many of you will be expected to contribute in ways you never imagined. You may have to pack boxes, clean out a storage closet, collect some old chemicals, or move furniture. Are you prepared to evaluate the hazards of these non-routine tasks? Are you comfortable applying the risk management process to reduce the number of accidents and therefore the likelihood of injury? Can Bad Aibling meet the challenge of the "mishap reduction initiative" laid out by Secretary of Defense Rumsfeld in the June 6th issue of the News and Views? For your sake, for your coworkers' sake, for your family's sake, I hope so. Ever vigil, folks. Ever vigil.